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TITLE: ORGANIC SILOXANE COPOLYMER FILM, ITS MANUFACTURING METHOD, GROWTH APPARATUS, AND SEMICONDUCTOR DEVICE USING SAME

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ABSTRACT:

PROBLEM TO BE SOLVED: To provide an insulating organic copolymer film which is suitable for an interlayer dielectric for isolating a multilayered copper wiring of a semiconductor device, is excellent in a mechanical strength and an adhesion

in an interface coming into contact with an underlayer or an inorganic insulating film of an upper layer, and has a low effective relative dielectric constant as a whole of the film.

SOLUTION: An annular siloxane and a straight-chain siloxane are used as a raw material, and the both are excited by a plasma and polymerized to form an organic siloxane copolymer film. An interface layer of a film quantity having an excellent minuteness, adhesion is provided in an interface coming into contact with the inorganic insulating film by forming a film composition with a straight-chain siloxane component as a principal component, and an annular siloxane component internalizing a cavity enclosed with a ring-like siloxane frame and a straight-chain siloxane component are mixed. The copolymer film has a layer having a stitch structure suppressing a density relatively and has a composition change in a film thickness direction, and a copper thin film is buried in the copolymer film to form the multilayered wiring.